

COUNCIL OF ARTS AND MANUFACTURES

OF THE

PROVINCE OF QUEBEC.

REPORT OF COMMITTEE

NAMED TO ENQUIRE INTO THE QUESTION OF

PRACTICAL SCHOOLS

REPORT OF A VISIT

TO THE

MANUAL TRAINING SCHOOL OF ST. LOUIS, MO.

MONTREAL:
L'ETENDARD PRINT 37 ST. JAMES STREET.



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1885

FRANCIS J. B. JONES

1871-1872

P R E F A C E .

The Council of Arts and Manufactures, with the intention of affording every facility to MECHANICS ARTISANS, APPRENTICES, and such others as may desire to acquire a knowledge of DRAWING, with a view to its practical application in the various trades and branches of industry, has established FREE EVENING DRAWING CLASSES in Montreal, Quebec and other places in the Province.

As a knowledge of Drawing is now universally acknowledged to be of the utmost value in all trades, the work carried on in these EVENING CLASSES is calculated to be of great advantage, not only to the workmen themselves, but also to their employers.

The total number of pupils in the various Schools is 1145, and notwithstanding many difficulties, the attendance has been comparatively regular, and it is safe to say that much good has been and is being accomplished ; the drawings made by the pupils show satisfactory evidences of progress, and in many instances pupils have bettered their positions and increased their earnings by means of the instruction afforded them in the Classes.

In order to give as practical a character as possible to the work and to keep pace with the demand, Classes have been opened in Montreal, during the past two years, in Wood Carving, Lithography and Wood Engraving.

The results which have been attained in these Classes have drawn the attention of the Council to the question of Practical Schools, such as are now in successful operation in various places in Europe and the United States.

A Committee was named to enquire into and make a Report on the subject, which Report is contained in the following pages.

The Report is not by any means as full or exhaustive as the Committee at first thought of preparing, and that which is herewith submitted is intended more for the purpose of attracting the attention of the public to the importance of the subject than for dealing fully with the question.

A Report is also given of a visit to the Manual Training School in

St. Louis, Mo., an institution which has now been in operation for four years and with very gratifying results.

It might be mentioned that the wood cut which appears in this pamphlet was made in the Wood Engraving Class in the Montreal School.

HENRY BULMER,
President.

S. C. STEVENSON,
Sec. C. A. and Mfrs.

Montreal, April, 1885.

(Translation.)

REPORT OF COMMITTEE

NAMED BY

The Council of Arts and Manufactures

TO ENQUIRE INTO THE QUESTION OF

PRACTICAL SCHOOLS.

At the meeting of the Council, held on the 28th February, 1884, the following Resolution was passed, viz. :

"That a Committee be named for the purpose of enquiring into the desirability of establishing day classes, with the view of a further development of Technical and Industrial Education in the School conducted in Montreal, under the control of the Council of Arts and Manufactures, and on what conditions these classes should be opened ; and further as to the desirability of establishing workshops in connection with the classes above mentioned in order to enable the pupils to put into practice the theoretical instruction which they receive and, also, to make enquiries, as to the installation that would be necessary for the opening of these new classes, and the establishment of the proposed work shops, and the probable annual expense that a school thus organized would entail."

The Committee named as above has the honor to submit the following Report:—

Regarding the first part of the Resolution, namely, the desirability of establishing Day Classes for the purpose of developing Technical and Industrial education, your Committee would note that the law constituting the Council of Arts and Manufactures gives it authority to take up a question of this nature so soon as the want shall make itself felt.

Doubtless experience alone will prove whether or not the time has arrived for developing the Schools of the Council in the direction referred to, and whether or not our population really feels this need ; the question, however, appears to us of sufficient importance to warrant the Council in making the experiment on a small scale.

In looking over the list of pupils who attend the Evening Classes, we are impressed by this fact, that the large majority are working men of different ages employed in various shops, and who come for the purpose of obtaining instruction which they have failed to receive at an earlier period of their lives. The assiduity and attention with which they follow the evening classes after the labour of the day, in many cases arduous but still necessary for their subsistence, is the most convincing proof that they, at least, appreciate the importance and the value of technical education even in the hasty and curtailed form in which the Council has been obliged to give it up to this time.

We should certainly take into account our general system of education, and it must be admitted that in Canada this system is probably not inferior to that in any other country ; nevertheless, on the other hand, special schools are, to a great extent, lacking.

We believe that practical day classes would attract a number of pupils who, already prepared in the Colleges, Academies and Common Schools, and seeing the liberal professions and the avenues of commerce crowded, would gladly avail themselves of the opportunity of receiving that practical instruction which would enable them to adopt one or other of the numerous careers which are presented to them in the field of industry.

- In placing trades among the subjects which might be learned at the school, in placing theory alongside of practice, the pupil himself would undoubtedly conceive a higher idea of the importance of labour.

We do not mean to assert by the above that the technical school would completely do away with the work shop, but merely that it would give opportunities for acquiring more quickly those principles and that knowledge which the workman, left to his own resources, could only acquire in the course of years by observation, and even then imperfectly. It should at least make him familiar with the processes and the tools which, in the generality of special industries and trades, have a certain degree of analogy.

For example, whether a workman turns in metal or in wood ; whether he turns by aid of the bow, of the foot, or of a machine moved by steam-power, the operation reduces itself to nearly the same method of manipulation. So in fitting, it always depends on a correct eye

and manual skill; and the individual who can fit a piece of iron by means of the file can fit a piece of wood with the aid of plane and chisel. Thus, both in technical and apprentice schools, can be taught the fundamental manual operations which are employed in all manufactures. Turning and fitting would form the practical portion of the instruction, geometry and linear drawing the theoretical part, and the elements of general technology the higher and finishing part.

It should be noted, *en passant*, that the same condition of things is manifesting itself in Canada in regard to the education of children as has been the result in other places; the parents perceiving that the education which their children receive at school will be of no great advantage in business or as an aid in gaining a livelihood outside of certain well-beaten tracks, take them away from school in order that they may place them at a trade. It should not be forgotten that a great majority of these children, more particularly in the cities, must follow industrial pursuits which they begin without any preparation whatever; and, furthermore, that often they are treated with indifference by their masters who, under the pretext of apprenticeship, pay them the least possible wages. To obviate this state of things, so detrimental to the material prosperity of a nation, such cities in the United States as Boston, New-York, Philadelphia, Chicago and others, have established special schools for the purpose of training artisans, just as they have special schools for the training of engineers, lawyers and physicians.

A manufacturer of Montreal, at the head of a large establishment himself, stated to one of us the causes that prevented boys, possessed of some education, from following trades; these were chiefly the fact of their being obliged to go through the stage of apprenticeship or commencement, and, during this period, being compelled to do drudgery work and to wait on the men till, by mere observation, they could learn to render themselves useful in some other way. "That is how the professions become over-crowded", added the gentleman, "and how it happens that a large number of young men who would have made excellent mechanics and could, by their intelligence, have helped to develop the industries and resources of our country, fill the ranks of the liberal professions with poorly qualified men." What a difference between this condition of affairs and that which Mr. F. D. Jackson, Professor of Art and Design in Birmingham, describes in regard to the French artisan:

"One noticeable feature in French industry is the universal application of art, no object being too mean for adornment; and every article

“capable of being turned into a thing of beauty receives its share of attention at the hands of the artist. To such an extent is this love of art carried, that mere mechanical finish is sacrificed at the shrine of beauty; and we find that the very things we pride ourselves upon, and boast of achieving, are by them set at nought in favor of aiming at a higher quality.

“The facilities for French students of industrial art are very great. Besides the ordinary academies, they have what are called ‘technical schools,’ where, in the same institution, drawing is taught, in which a knowledge of a trade to which art is to be applied can also be acquired, the fees for which are almost nominal. This class of school is, I think, of the utmost value, and clearly demonstrates that the French do really possess ‘schools of practical art.’”

It appears to us, charged as we are by the Council to look into a question new in our country, that it will be most satisfactory to gather together the experiences of those who have already taken steps in this direction. To the testimony given above regarding the utility of applied or Practical Schools, we will add the excellent remarks of Mr. Stetson, a distinguished educator of the neighbouring Republic, on the same subject. He expresses himself in the following terms:

“The person who has general charge of any business should understand the business both theoretically and practically. His knowledge of principles should be such as to enable him to instruct any subordinate requiring instruction, to determine at once the comparative value of different processes of work, or to invent new ones when emergencies require it. In a word, he should be able to reach just conclusions at once by his knowledge of principles, and not by trial and error. He should be workman enough to know when work is well done, that he may not be cheated by those under him, and that he may be able to render justice unto all by duly discriminating between the skilled and the unskilled laborer. He should understand his business as a whole, and the relation of each part to the whole. Neither skilled workmen nor tariffs can compensate for stupidity on the part of the superintendent. Only the few exceptional geniuses, like Stephenson, become thus qualified to take charge of enterprises, great or small, without special school instruction.”

Regarding the question of determining on what conditions it would be most desirable to open day classes, we find the greatest difficulty

in arriving at a decision. However, as these classes would chiefly be followed by pupils possessing some means, we are of opinion that the payment of certain fees should be exacted : this would have the double advantage of causing the pupils to regard the technical instruction which they receive as of more importance than they otherwise would, and also of assisting in the maintenance of the school.

It should be borne in mind, moreover, that instruction of a technical and practical character is of some value and would enable those receiving it to acquire more quickly than by the ordinary system of apprenticeship the requisite knowledge and skill to succeed in industrial pursuits ; there would thus be no hardship in imposing on boys of well-to-do parents a moderate charge for such advantages.

Passing to the question of the proper organization of a School such as we are speaking of, and to the question of what subjects ought to be taught, your Committee is reluctant to express itself in very definite terms. The course of instruction given to pupils ought certainly to be in accord with the requirements of those industries already established in the country as well as of those which may be established in the future. But, as we may be said not to possess any industries which can be regarded as exclusively our own, and as the large number and variety of our natural resources has the effect of causing us to go into most of the manufacturing enterprises in which those nations with which we have commercial relations and which send us their goods are engaged, we are of opinion that for the present a number of Special Courses would suffice, as for instance, Construction, Applied Chemistry, Metallurgy, Geology and Applied Mechanics.

The knowledge to be gained in these Classes is the same for all times and for all countries, and could be applied in nearly all our industries. Experience would soon show in what manner the course might be altered and what development would be required.

With the view of arriving at the most satisfactory conclusion, we sought for information in such quarters as we considered would give the most satisfactory results ; among others from whom we asked for information was Mr. J. E. Sweet, of Syracuse, N. Y., formerly a Professor in the University of Cornell, and who replied in the following terms :

“ My seven years at giving practical instruction while at Cornell University, and a constant observation of the working of similar institutions, taught me many things that ought to be of service, but none other so valuable as this. *Find the man* naturally gifted, trained by a

varied experience, and enthusiastic in the success of his students, to take charge ; let him form his own plans, select his own assistants, follow no copy, refer to no precedents, adopt no Russian System, no Cornell System, no Boston or Worcester System, but make it a School of your own, to train young men for your own industries. If you find the man you may succeed gloriously. If not, and you attempt to carry out some other people's plans, you will be but imitators at best. Do not above all things let the idea be entertained that a decimal part of the entire expense can be got out of the work done by the students, though with me everything done by the students was for a purpose and unless spoiled was of value. It would be a long and tiresome task to give the arguments that I could produce to sustain my ground, and explain all the advantages, and difficulties to be encountered and overcome in the establishment of a successful school of practical instruction, but if any of your people can make it convenient to call on me I shall be glad to confer with them, if it is thought the result of my experience can be rendered of any service. "

We are also instructed to enquire into the desirability of establishing workshops in connection with day classes, to enable the pupils to put into practice the theoretical instruction they would receive in the school. As we have stated above, the establishment of workshops in connection with the classes for a limited number of pupils appears to us to be desirable, and the experiment could be made while keeping the expenses down to a reasonable figure.

In addition to the reasons already given in justification of a trial we might add the following.

It is a well known fact that since the use of machinery has been adopted in almost all branches of industry, the system of apprenticeship and the advantages connected therewith have almost disappeared. The division of labour has also brought about another phenomenon not less surprising ; that is, that ten men may be employed to do a certain piece of work, and each one doing only his own part, the result will be a piece of perfect workmanship, while if each one were left to his own resources and not to the completion of simply one part of the whole, he would be quite unable to complete the finished piece of work.

" The use of machinery, " says Mr. Stetson, " the character of which is often such as to put an end to small enterprises, has promoted this subdivision by accumulating workmen in large groups. The beginner,

confining himself to one department, is soon able to earn wages. This gratifies both himself and his parents ; and so he usually continues as he began. If, however, he wishes to become a master of his trade, and the employer agrees to instruct thoroughly, the latter is often tempted to keep his apprentice at work an undue time in the department he may have first well learned, and in which his labor is, consequently, profitable. If the employer does not yield to this temptation, then who is there to give the apprentice proper instruction, seeing that so many workmen usually work by the piece, and cannot afford to spend any time in the instruction of others? Nobody. Thus it happens that the beginner usually confines himself to one department, and is only anxious to receive wages as soon as possible."

Let us see, according to a Master Mechanic, what knowledge and skill an apprentice can gain, what his chances of success are, in following the old system.

"It must be acknowledged, that, in large workshops, apprentices are not in such favorable circumstances for learning their trades as in smaller ones. Establishments with large capital undertake considerable contracts, and are therefore compelled to make many things of the same description. In a small workshop, on the contrary, where they execute a variety of works, the same objects are not turned out in so large a number. If a young man executes well (in a large workshop) a piece of work which is intrusted to him, it may happen that he has given to him the same work for a year or more."

It can be readily understood from the above that the genuine tradesman, who thoroughly understands his trade from beginning to end, is becoming more and more rare. If it does not require a skilful workman to control the motion of a piece of machinery, there are yet many cases in which this machine is unable to replace the skill of hand, and much less the intelligence, of the workman ; it is thus chiefly for the minority destined to have charge of industrial establishments or to do work for which machinery is not suitable, that workshops in connection with day classes would prove useful. If, moreover, manual training is regarded as a means of instruction, it is so much the more entitled to its place in a technical School. Chemical processes require a certain amount of knowledge and practice ; why should it be otherwise in regard to the construction of machinery or buildings, or any other industrial operation ?

"It is only possible to teach by four methods : 1st. Oral explanation given by the teacher ; 2nd. Written explanation taken from books ; 3rd. Graphic explanation rendered by drawing ; 4th. Practical explanation obtained from execution. Up to the present time, only the first three methods of demonstration have been employed, and nothing but theorists produced : the moment that it is desired to train practical men, the fourth method will be added, and technical instruction will have been founded.

"Every technical school must admit into its course the manual labor of the workshop, and of the laboratory : that is its distinctive characteristic, the cause of its existence.

"This principle admitted on general grounds, it becomes still more incontestable when applied to special industries. Machine manufacture, building, dyeing, weaving, &c., require not only a knowledge of applied science, but also a practical acquaintance with manual operations. Thus, by the side of industrial schools with general programmes, there must exist special schools, for particular trades, established, like the first, to train managers and foremen."

We end the quotation here, because it includes all that we recommend to be undertaken by the Council of Arts—to train young men to fill the positions (often lucrative) of master-mechanics and foremen, and for that purpose to add to the theoretical classes already mentioned instruction in the working of wood and iron in the workshops, the course to be open to thirty pupils at the most, to begin with.

In order that the progress of the pupils may be as rapid as possible, only those should be admitted to the course who have received sufficient preparation and who could successfully pass an examination on such subjects as might be agreed upon. Such subjects as can be easily learned in our numerous and excellent schools should not enter into the curriculum of a School such as is here proposed. The work of a technical school, as we understand it, takes it for granted that pupils have already received sufficient schooling and that they desire to acquire knowledge of a particular kind with a view to its practical application.

In conclusion, we are of opinion that special instruction which can be applied to the material, would be at once more fruitful in good results and more attractive if the pupil could go from the class room to the workshop to practically demonstrate the theories to which he has just been listening. In support of this opinion we might add the observations made in our own evening schools where the most note-

worthy and rapid progress is made in those cases where the pupil has occasion to put into actual practice on the material itself, the instruction which he has received in the Drawing Class. It is an easy matter to understand the eagerness with which young people enter into any work which brings them practical results, and which puts them in the way of gaining a livelihood more easily, or of helping them to secure success.

The cost of fitting up workshops for work in wood and metals for thirty pupils would be \$3,287.00, and this would be sufficient for the first year, during which time the pupils would become familiar with the use of tools and with the properties of different materials. For the second part of the course the cost would be larger, and we have estimated it at \$6,540.00. The entire cost of the fitting up would thus be \$9,827.00. The expenses for instruction and maintenance would probably amount to about \$4,000.00 annually.

The following list shows in detail the expenses of fitting up and maintenance, viz :

FIRST YEAR.

30 sets Carpenter's Tools @ \$20.00.....	\$600.00
20 Carpenter's Benches @ \$6.00.....	120.00
20 " Vises @ \$2.00.....	40.00
20 Speed Lathes with Counter Shafts @ \$60.00	1,200.00
20 Portable Forges @ \$20.00.....	400.00
20 Anvils, average 130 lbs @ 11 c.....	280.00
20 set Anvils Tools @ \$4.00.....	80.00
6 Blacksmith's Vises @ 12 c. lb.....	72.00
Belting, etc.	320.00
Shafting, Hangers, Pulleys, &c.....	175.00
	\$3,287.00

SECOND YEAR.

15 Engine Lathes, 14 in. x 5 in. Bed @ \$300.00	\$4,500.00
1 Drill Machine, 22 in. Back gear and Auto- matic feed.....	400 00
1 Iron Planer, 20 in x 20 in. x 5 in., with down cross and Angle feed.....	400.00
1 3 in. Brainard Milling machine.....	1,000.00
20 Machinist's Vises @ \$12.00.....	240.00
	\$6,540.00

ANNUAL EXPENSE.

1 Professor	\$1,200.00
2 Foremen for workshops @ \$720.00.....	1,440.00
Rent and Steam power.....	500.00
1 Guardian.....	450.00
Sundries	410.00
	\$4,000.00

Suitable premises with motive power could be rented in Montreal for a term of years in the vicinity of the present Evening School of the Council of Arts, and we consider that this would be preferable to incurring the expense of erecting a Special Building ; it would be time enough to do this when the School shall have become firmly established and have demonstrated the directions in which it should be developed.

It is well understood that the only outlay required to make a start would be the expense of fitting up necessary for the first year's work, that is, the sum of \$3,287.00 ; the result of the first year's operations would probably determine the future of the School. We might observe at this point that, looking at the subject in the least attractive light, if the enterprise should be undertaken by the Council and should fail to meet with success, all the materials used in the first year alone, or for the two years of the course, would still be valuable for other purposes and could be disposed of at a slight reduction.

We have put down \$9,827.00 as the entire cost of the fitting up of the workshops required for a Class of thirty pupils, but this amount could probably be reduced by one half by following the system adopted in other Schools of a similar character, where the instructors find it more advantageous to divide the Class into two sections, one being employed in the workshops while the other is engaged in the Class Room.

The whole respectfully submitted.

A. LÉVÊQUE.
C. DUQUET.
S. E. DAWSON.
G. BOIVIN.
M. J. F. QUINN.
J. F. PEACHY.

REPORT OF A VISIT TO THE MANUAL TRAINING SCHOOL, ST. LOUIS, MO.

S. C. STEVENSON, Esq., B. A., *Secretary of the Council of Arts and
Manufactures.*

As the question of the establishment of practical schools is now attracting much attention, I took advantage of my recent trip to St. Louis, Mo., in December last, to visit the Manual Training School in connection with Washington University, in that city, in order to obtain such information as might be interesting in connection with this important subject.

The school building is a fine structure of large dimensions, situated in a very desirable portion of the city, adjacent to the University at the corner of Washington Avenue and Eighteenth Street, having a frontage of 106 feet on the former, and 100 on the latter. I was courteously received by Dr. C. M. Woodward, the Director, who accompanied me through the building, and permitted me to see the various classes at work in the recitation rooms and in the workshops. The school differs from most other technical schools, but is conducted on a somewhat similar plan to that of the Boston School of Mechanic Arts. The course extends over three years, and pupils are admitted at the age of fourteen. The school is not intended for the preparation of pupils for any particular trade, nor is it assumed that every boy who goes through will become a mechanic or a manufacturer.

The main object of the school seems to be to modify the system of education in such a way as to adapt it to the changed conditions of modern life. It recognises the fact that a large number of the boys who go through our public schools will have to make their living by the work of their hands, and while in no way neglecting the growth and cultivation of the mind, it aims to train the hand at the same time.

A great change has been wrought in the habits of the people by the introduction of steam and machinery. Has our system of education kept pace with these changes, or has it faced about to meet them? This question is of the deepest concern to all who are interested in the progress and welfare of our Dominion. Other countries are stirring themselves in the matter. We cannot afford to be laggards. I hope

before long to deal with this subject more fully, and in the meantime will confine myself to a description of the St. Louis Manual Training School, the success of which seems to amply prove the possibility and wisdom of carrying on study and recitation simultaneously with tool instruction and manual exercise.

Description of Shops and Tools.—There are, in all, five large shops. A third story room, 50 feet by 40 feet, is so fitted up that it can be used as a carpenter shop or as a wood-turning shop. A second story room, 40 feet by 40 feet, is fitted up similarly, and is furnished with lathes and benches for carpentry, wood-turning, and pattern-making.

A ground floor, 40 feet by 40 feet, serves as a forging shop, being furnished with twenty-two forges, anvils, etc. The machine shop and engine room is on the first floor, 50 by 40 feet. It contains sixteen lathes, two drills, a planer, a shaper, and a full set of benches and vises.

Each wood-working shop has uniform accommodations for a class of twenty-four pupils. Three such classes or divisions can be taught daily in each. Each pupil has one of the uniform sets of hand edge tools for his exclusive use, kept in a locked drawer when not in use. For the care and safety of these tools he is held responsible.

The forging divisions are limited to twenty-two, and the machine shop sections to twenty.

Details of Shop Instruction.—The shop instruction is given similarly to laboratory lectures. The instructor at the bench, machine, forge, or anvil, executes in the presence of the whole class the day's lesson, giving all needed instructions, and at times using the blackboard.

When necessary, the pupils make notes and sketches (working drawings), and questions are asked and answered, that all obscurities may be removed. The class then proceeds to the execution of the task, leaving the instructor to give additional help to such as need it. The supply of raw materials and of tools is the same for all. At the time specified the lesson ceases; the work is brought in, commented on, and marked. It is not necessary that all the work assigned should be finished. The essential thing is, that it should be well begun and carried on with reasonable speed and accuracy. All the shop work is disciplinary. Special trades are not taught, nor are articles manufactured for sale.

The Object of the School may be best stated in the words of Dr. Woodward—

“The Manual Training School is not an asylum for dull or lazy boys. It clearly recognises the pre-eminent value and necessity of

intellectual development and discipline. In presenting some novel features in its course of instruction, the managers do not assume that in other schools there is too much intellectual and moral training, but that there is too little manual training for ordinary American boys. This school exacts close and thoughtful study with books as well as with tools. It purposes, by lengthening the usual school day a full hour, and by abridging somewhat the number of daily recitations, to find time for drawing and tool work, and thus to secure a more liberal intellectual and physical development—a more symmetrical education."

The Development of Natural Aptitudes.—It is confidently believed that the developments of this school will prevent those serious errors in the choice of a vocation which often prove so fatal to the fondest hopes. It occasionally happens that students who have special aptitudes, in certain directions, find great difficulty in mastering subjects in other directions. In such cases it is often the best course to yield to natural tastes, and to assist the student in finding the proper sphere of work and study. A decided aptitude for handicraft is not unfrequently coupled with a strong aversion to and unfitness for abstract and theoretical investigations. There can be no doubt that, in such cases, more time should be spent in the shop and less in the lecture and recitation room. On the other hand, great facility in the acquisition and use of language is often accompanied by a great lack of either mechanical interest or power. When such a bias is discovered, the lad should unquestionably be sent to his grammar and dictionary rather than to the laboratory or draughting-room.

Another great object of the school is to foster a high appreciation of the value and dignity of intelligent labor, and the worth and respectability of laboring men. A boy who sees nothing in manual labor but mere brute force, despises both the labor and the laborer. With the acquisition of skill in himself comes the ability and willingness to recognise skill in his fellows. When once he appreciates skill in handicraft he regards the skilful workman with sympathy and respect.

Prospectus of the School.—As I have before stated, pupils are admitted to the school at the age of fourteen, and candidates for admission should, in general, be prepared for the high school. The pupils are divided into three classes, the junior, the middle, and the third years, the fees in these being \$60, \$80, and \$100 respectively.

The course of instruction covers three years, and the school time of the pupils is about equally divided between mental and manual exercises. The daily session begins at 9 a. m., and closes at 3-20 p. m.

Each pupil has three recitations per day, one hour of drawing, and two hours of shop practice.

The course of instruction embraces five parallel lines, three intellectual, and two manual, as follows :

1st. A course of Pure Mathematics, including arithmetic, algebra, geometry and Plane Trigonometry.

2nd. A course in science and applied mathematics, including physical geography, natural philosophy, chemistry, mechanics, mensuration, and book-keeping.

3rd. A course in language and literature, including English grammar, spelling, composition, literature, history, and the elements of political science and economy ; Latin and French are introduced as electives with English.

4th. A course in penmanship, freehand, and mechanical drawing.

5th. A course of tool instruction, including carpentry, wood turning, blacksmithing, and bench and machine work in metals.

The manual work of the junior year is in wood, including carpentry and joinery, wood-carving, wood-turning, and pattern-making.

In the middle year, blacksmithing, including drawing, upsetting, bending, punching, welding, tempering, soldering, and brazing.

In the third year or highest class the manual work is in the machine shop, and consists of bench work, and fitting, turning, drilling, planing, screw cutting, etc., and also the study of the steam engine. It will thus be seen that while the manual work is an important feature of the school, intellectual culture is not by any means neglected.

The school has accommodation for 240 pupils, and each of the three classes is divided into sections.

In going through the school I saw one section of the junior class working at algebra in the recitation room, and afterwards saw the same section, the boys with their aprons on, actively at work in the carpentry shop.

In another recitation room I saw a section of the middle year, at English history, and afterwards saw the same boys at work in the blacksmith shop, each by his forge, engaged in an exercise in welding. I was much struck by the eager interest which the boys manifested in their work. They looked bright and happy, and seemed to perform their task with intelligence and care, and with much more skill than I could have expected. I was so much interested in watching how they managed the fires, and hammered the iron, that I remained till the exercise was finished, when they all brought their work to the instructor,

and he commented on the manner in which each piece was done, and gave instruction in regard to the defects he had observed while the class was at work. In answer to my enquiries Dr. Woodward assured me that the progress of the pupils in literature and mathematics was none the less, because they spent two hours a day learning the use of tools, and the conditions of materials. Indeed, from what I saw, I should think that this manual training was more like a delightful recess for the boys than hard work, and that they would go back to their studies with renewed zest, after this agreeable change of occupation.

I could go on at considerable length describing the many interesting things which I saw, but as my present intention is to give only a general idea of the working and objects of the school, I shall not trespass further on your time.

I should have mentioned that students provide their own books, drawing boards, and drawing instruments, and also their own pocket tools. The school furnishes shop tools and materials.

The excellence of the school and of the system on which it is conducted, is manifest to any one who will visit it, and its success is attested by the fact that the applications for admission are far in excess of the capacity of the school.

I attribute this success to the sound basis upon which the school is established, to the wise administration, energy and enthusiasm of Dr. Woodward, the director, and to the remarkable fitness for their positions of the gentlemen who have charge of the workshops. Dr. Woodward claims that, even in manual training, the chief object is mental development and culture, and that manual dexterity is but the evidence of a certain kind of mental power. The primary object in the shop instruction is the acquirement of skill in the use of tools and materials, to impart a knowledge of how a machine or tool should be used, and not the attainment of the skill to produce the fine work or rapid execution of a skilled mechanic.

I was very much impressed by my visit and I am convinced that if popular education is to supply the needs of the day, it must, while not neglecting, or even subordinating mental culture, include in its scope this practical character, which will better enable the coming generation to deal with the material forces and the active work of life. The question naturally arises—to whom does this duty belong.

This new educational movement must advance—it is advancing in other countries, what are we in Canada doing?

Shall we look to our Universities, our seats of learning, for a move in this forward direction ; they take good care to provide us with plenty

of men for the professions, should they not also look to education in connection with the industrial and manufacturing industries of the country? Should the work be taken up by our department of Public Instruction, or by our School Commissioners? Should the Council of Arts and Manufactures take it up, or should it be left to private enterprise?

On whomsoever the duty may devolve, it is of the highest importance that it should be carefully considered and carried out with the greatest attention in order to ensure success.

The wood cut hereto annexed is given in order to show the divisions on one of the principal floors of the Manual Training School of St. Louis.



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MANUAL TRAINING SCHOOL

ST. LOUIS, MO.

PLAN OF FIRST STORY.

